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the illuminated ripples which are then projected by the second grating. In the figure sunlight arriving at  $L$  is reflected from the large mirror  $M$  (one foot square), passing thence to and from the shallow rectangular trough  $T$ , containing mercury, to be again reflected by  $M$ , to the screen  $S$ . If a lens is placed at  $B$ , so that  $T$  is the conjugate focus of  $S$ , magnificent ripple patterns are seen on the screen whenever the table is slightly jarred by drumming on it with the fingers. These are stationary capillary waves originating at each of the straight edges of the trough. They may be obtained in different wave lengths in the ratio of 1:2, according as the table is more or less sharply rapped. Gravitational waves, though always markedly present, do not appear in the picture and may be ignored. To produce them observably it is necessary to have some special device for starting them. Two or three straight iron or steel wires, lying stably at  $w$ , on the capillary edge of the trough, are an excellent wave producer if controlled by the electromagnet  $E$ . Among interesting experiments of this kind I will only mention the reflection of waves, which advance with a crest and return with a trough, from a fixed obstacle, the lines in the image being respectively light and dark. It takes some practise, however, to see this, for with troughs as shallow as convenient the velocity will not lie much within six inches or a foot per second.

Returning from this digression, let the lens be removed and replaced by a grating,  $G$ , capable of rotation about a vertical axis. When the proper angle is obtained, a fairly sharp image of the ripples may be seen whenever the table is jarred. Care must be taken to avoid errors due to the diffraction by the grating of the light issuing from the round capillary edge of the mercury in  $T$ . These lines of light give rise to extensive streamers on the screen, intersected by sharp diffraction cross bands,

the streamers intersecting each other at right angles in the patch of light due to the mercury surface proper. Hence an annular screen,  $AA$ , is added to blot out the convex edges.

If  $x$  is the (broken) distance between mercury and grating,  $G$ , if  $y$  is the distance between grating and screen,  $\theta$ , the azimuth angle of  $G$  for which the image appears sharpest, finally if  $a$  is the distance apart of the ripples and  $b$  the grating space, the relation  $a = b \cos \theta (1 + x/y)$  is available. To give an example of experiments tried in this way, I found roughly,  $x = 105$  cm.,  $y = 670$  cm.,  $b = .21$  cm.,  $\theta = 30^\circ$ , whence  $a = .2$  cm.

If the trough  $T$  is long (say two feet long and three inches broad), the waves from the end are dampened out before they reach the middle, and the cross waves are alone in presence there. These lines of light, if the long edge is parallel to the direction of projection, give sharper images. I have not yet, however, been able to develop this method to a degree useful for measurement, and I merely communicate it here as an interesting experiment. I may note, in conclusion, that if progressive instead of stationary ripples be produced, and if the grating move in a direction opposite to the ripples, with a velocity increasing until the shadow bands moving in the first instance become stationary, the velocity of the ripples would be deducible as well as their wave length.

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#### REVIEWS OF CURRENT BOTANICAL LITERATURE.

A LITTLE more than a year ago at the annual meeting of the Society for Plant Morphology and Physiology, held in New Haven, a committee, consisting of Dr. Farlow of Harvard University, Dr. MacDougal of the New York Botanical Garden and Dr.

von Schrenk of the Missouri Botanical Garden, was appointed to consider the question of securing better reviews of current botanical literature. A preliminary report was made by this Committee last June, at a special meeting of the Society held in New York at the time of the meeting of the American Association for the Advancement of Science. In this report the committee includes the correspondence between the secretary of the Society, Professor Ganong of Smith College, and Dr. Oscar Uhlworm of Cassel, Germany, the Editor-in-Chief of the *Botanisches Centralblatt*. Realizing that the aim of the *Centralblatt* is to publish such reviews and that it is inadvisable to multiply journals, the committee suggested some changes in the plan and management of that publication. In the words of Professor Ganong's letter :

The chief cause of dissatisfaction with the *Centralblatt* in this country, is its policy of publishing only a part of the reviews in the *Centralblatt* itself, relegating the remainder to *Beihefte*, for which a considerable additional subscription must be paid. If this were rendered necessary by the number of the reviews there could be no objection to it, but obviously the additional reviews necessitating the *Beihefte* are crowded out by the publication of the *Originalmittheilungen*. Those who subscribe for the *Centralblatt* do so for the sake of the reviews and announcements of new literature, and not for the original articles, which have no logical place in a journal devoted to reviews. The Committee feels assured that the relegation of the *Originalmittheilungen* to the *Beihefte*, or their omission altogether, and the inclusion of all the reviews in the *Centralblatt* itself would make the *Centralblatt* much more widely and completely acceptable to botanists. They believe, also, that the increased support which would be given it would compensate for any loss of subscriptions by the cessation of the *Beihefte*, and also (and this they regard as of much importance) it would tend to prevent the appearance of any competing journal.

In regard to matters of detail the committee's letter continues :

The Committee, with other botanists, believes that the reviews of a journal devoted to communicating the appearance of new literature should be, above all, *prompt* and *descriptive*. What botanists mainly wish to learn from reviews is whether the work reviewed is important to their particular interests, and what its contribution is to the science as a whole. The abstracting of the contents of a book or paper in detail seems rather to belong to such a work as Just's *Jahresbericht*, and may well be left to it, thus shortening the descriptive reviews, and making it the easier to include them all within the limits of a journal without the need for *Beihefte*. Promptness in the appearance of reviews is particularly desirable, particularly to those who live at a distance from the place of publication.

The reply to this communication, while encouraging, was not all that the committee desired. Thus, while the editors of the *Centralblatt* were willing to confine the reviews to the journal itself, relegating the original articles to the *Beihefte*, they wished to be guaranteed a certain annual subsidy, and to still retain the right to require the subscriber to pay for both *Centralblatt* and *Beihefte*. To these stipulations the committee very properly demurred, and after discussing other proposed plans, *e. g.*, the printing of such reviews in the form of a card catalogue, or the establishment of a new journal, asked for more time for further consultation with the publishers and editors of the *Centralblatt*.

Accordingly a second interchange of letters was had, and the results were laid before the Society as a second report, in December last, during the annual meeting held in Baltimore. Professor Ganong's letter is as follows (omitting some formal matters which need not be repeated here):

The Committee has given very careful consideration to the letter of the editors and publishers of the *Centralblatt*, and has gathered all available data from the discussions of the society and by correspondence with many botanists in America and elsewhere. As a result the Committee has to present the following

reply to the propositions contained in your recent letter :

1. You propose that, in return for certain specified changes in the *Centralblatt*, a certain annual subsidy (or else a certain number of subscriptions) to the *Centralblatt* shall be guaranteed by this Committee or by some other body of American botanists. The Committee is firmly assured that such a guarantee in either form could not secure the support of any botanical organization in this country, and hence regards it as useless to consider this point further.

2. Your offer to increase the size of the *Centralblatt* from 104 to 129 Bogen yearly does not appear to the Committee an improvement in the direction desired by American botanists. As pointed out on page 6 of the report, there is no dissatisfaction on the score of relatively insufficient attention to American literature, and hence no reason on that account for an increase in the size of the *Centralblatt*.

3. You propose to separate the *Referate* from the *Originalmittheilungen* and to publish *Referate* in one *Abtheilung*, and *Originalmittheilungen* and *Neue Literatur* in another, the two, however, not to be obtainable separately by subscribers. While the proposed separation has certain advantages, its value is practically entirely destroyed by the condition that the two *Abtheilungen* cannot be subscribed for separately. The Committee regards it as an indispensable condition to the future active support of the *Centralblatt*, or any other journal of like aims, that it shall be possible to subscribe for *Referate* and *Neue Literatur* without being obliged to pay for *Originalmittheilungen*, which have no logical place in a journal devoted to reviews.

4. You propose the establishment of an American Board of Editors. This proposition has been received by the Committee, and as well by the members of the Society and by other botanists, with much satisfaction. The opinion appears to be general that such a step would contribute greatly to make the *Centralblatt* acceptable to American botanists.

The Committee finds itself obliged to state, therefore, that in its opinion no change in the *Centralblatt* will make it acceptable to American botanists which does not permit of subscribing for *Referate* and *Neue Literatur* without having to pay for *Originalmittheilungen*. If this change were made in the *Centralblatt*, and if an American Board of Editors were appointed as proposed by you, the Committee has no doubt that the minor reforms, the need for which was referred to in its former letter, could gradually and satisfactorily be brought about. Such changes would remove all reason for the existence of another and competing journal, and would, in the opinion of the Committee, attract to the *Centralblatt* an additional support which

would not only compensate for any present pecuniary loss, but prove ultimately greatly to its financial advantage. The opinion appears to be nearly unanimous among botanists consulted by the Committee, that it would be far better that the *Centralblatt* should be modified to meet what appear to be but reasonable requirements in a journal devoted primarily to reviews than that a new journal should be started, and that the starting of a new journal should be resorted to only after every effort has been made to secure the desired reforms in the *Centralblatt*.

Under these circumstances the committee ventures to hope that the editors and publishers of the *Centralblatt* will take these matters again into consideration, and may be able to return a reply that will be proved a solution of all present difficulties.

To this letter, Dr. Uhlworm replied as follows :

After mature consideration of your propositions, in regard to the justice of which we have had no objections from the beginning, we have come to the conclusion to publish nothing but *Referate* and *Neue Literatur* in the regular series of the *Botanisches Centralblatt*, which is to be of the same size and price as heretofore, and which can, of course, be subscribed for by itself. The *Beihefte*, however, which appear from time to time and may likewise be subscribed for alone, would then contain the original articles. In regard to the financial support of the American botanists, concerning which we had spoken only because we had concluded from your first communication that you proposed a considerable increase in the size of the *Centralblatt*, we shall of course say nothing more under the existing circumstances. We should feel deeply grateful, however, if your Committee, and especially the two gentlemen whom you select as associate editors, would give us your support by an active cooperation, and would bring the *Centralblatt* to wider notice in America. \* \* \* Above all things, I am naturally desirous of presenting the new American literature as rapidly and completely as possible to our readers in the future. In this connection, however, I must ask for support from you to the extent that you cause the American authors, institutions, societies and periodicals to send me a copy of newly published articles as quickly as possible for publication in *Neue Literatur*. Written titles conduce, as I know from years of experience as a librarian and editor, only to unfortunate errors and to confusion.

It is to be hoped that a union of the American and European botanists will result in a real advance in the *Centralblatt*. I shall do all in my power to bring this about. I shall do my best to make this

joint work a most successful undertaking. I hope that I shall succeed in making similar arrangements with the botanists of other countries.

The report comments upon the foregoing as follows :

The committee feels that the Society is greatly indebted to the editors of the *Centralblatt* for their courteous letter and must be highly gratified with their statement of the changes which they express themselves prepared to make in the near future. The changes, as will be seen from Dr. Uhlworm's letter, are in conformity with the suggestions made by the committee in its report and will meet with the approval of all American botanists. It is proposed to include in the *Centralblatt* proper, only reviews and the index of literature; the *Beihefte* will contain only original articles; the *Centralblatt* may be subscribed for without also subscribing for the *Beihefte*, and, lastly, the price of the *Centralblatt* is to remain as at present. On these points, therefore, the letter of Dr. Uhlworm is entirely satisfactory.

The suggestions that American editors be nominated by a representative body of American botanists seem to be excellent and likely to prove helpful to the *Centralblatt* by stimulating our botanists to make a determined and combined effort to do all in their power to enable the editors of the *Centralblatt*, so far, at least, as American botanical literature is concerned, to make their journal indispensable to all botanists. Hereafter, it will be a matter of pride to us to show that our interest is not merely passive, but that we are ready to make active individual and collective effort to secure a desirable result.

The Committee closes its report with the following recommendations :

*First*, that the Secretary be directed to write to Dr. Uhlworm and express our hearty approval of the changes proposed, and our readiness to cooperate.

*Secondly*, that a committee of three be appointed by the Society with full power to represent the Society in further negotiations with the management of the *Centralblatt* up to such time as the selection of American editors shall have been definitely made, the committee to report to the Society at its next annual meeting.

*Thirdly*, that the committee thus appointed be requested to invite one botanist from the Central States and one botanist resident on the Pacific Coast to serve with them in the selection of American editors, and in such preliminary business as may be necessary for the furtherance of the plans proposed by the editors of the *Centralblatt*.

*Fourthly*, that a copy of this report, or of such

parts of it as may seem desirable in order to call the attention of our botanists to the changes to be made in the *Centralblatt*, be sent to the *Botanical Gazette*, the *Bulletin of the Torrey Club* and to SCIENCE.

In accordance with the second recommendation, Messrs. Farlow, MacDougal and Ganong were appointed upon the new committee to carry out the work to completion, and Messrs. Trelease and Campbell have since been added, in accordance with section three above. The botanists of the country are to be congratulated upon the results achieved by these negotiations. The changes proposed, and in part already put into effect, promise to make the *Botanisches Centralblatt* an efficient and economical journal of reviews indispensable to every working botanist. It is hoped that those of America will manifest their appreciation of its advantages, and their acknowledgment of the efforts of its editors and publishers to meet their wishes, by a cordial and practical support. Upon this latter subject a further communication is expected from the Committee. CHARLES E. BESSEY.

#### SCIENTIFIC BOOKS.

*Proceedings of the Society for the Promotion of Engineering Education.* Vol. VIII. 1900.

Edited by PROFESSORS JOHNSON, KINGSBURY and JACOBY. New York, Engineering News Publishing Co. 1900. 8vo. Pp. 377.

It may be doubted whether, in any other department of applied science, a larger, a more important, or a more fruitful work is being done than in the field occupied by the Society of which the transactions are here recorded. The members of the Society are engaged in the technical schools and colleges of the country in the professional training of men who are to hereafter lead in the application of the discoveries of science, of the inventions of the useful arts and of the methods of modern industrial operation in the new century. Their work is the instruction of youth who, having completed the general education that their parents' money and their own time and scholarly proclivities may afford them, turn their attention to the